Avaya Solution & Interoperability Test Lab

Application Notes for Configuring Compressed Real-Time Protocol over Point-to-Point Protocol between Juniper Networks J4300 and M7i Routers to Support an Avaya IP Telephony Infrastructure – Issue 1.0

Abstract

These Application Notes describe the steps for configuring Juniper Networks J4300 and M7i routers to use compressed Real-Time Protocol (cRTP) over a Point-to-Point Protocol (PPP) connection to support an Avaya IP Telephony Infrastructure consisting of Avaya Communication Manager and Avaya IP Telephones. The Juniper Networks routers will perform header compression for all RTP traffic traversing the PPP connection to minimize overhead used by the RTP packets thus increasing available bandwidth.

©2006 Avaya Inc. All Rights Reserved.

1. Introduction

Real-Time Protocol (RTP) packets generated by Voice over Internet Protocol (VoIP) telephony are typically small in size ranging in tens of bytes per packet. IP (20 bytes) and User Datagram Protocol (UDP) (8 bytes) headers are then added onto each packet before transmission. Because of the relative small packet size of RTP packets, the IP and UDP headers are all overhead. For RTP packets that traverses a Wide Area Network (WAN) with limited bandwidth, these headers represents an opportunity for bandwidth saving that could otherwise be use for other traffic or additional VoIP calls. This is the main idea behind the use of compressed Real-Time Protocol (cRTP).

It is most common to use the G.729 codec for calls across a low speed link due to its lower bandwidth requirement, but either G.711 or G.729 codecs can benefit from cRTP.

Figure 1 shows the sample network used in these Application Notes. Two separate IP networks, one in each location, are connected together by a pair of Juniper Networks routers over a PPP connection. Each location contains an Avaya Media Server, an Avaya Media Gateway, and Avaya IP Telephones. An H.323 trunk configured between the two Avaya Communication Manager systems allows calls to be routed between the two systems. Both the Juniper Networks M7i and J4300 routers are configured to perform RTP header compression for all RTP packets traversing the PPP connection. Both routers are configured to prioritize VoIP traffic based on DiffServ Code Point (DSCP) information encoded in each VoIP packet. Bandwidth allocation was set on all interfaces shown to guarantee that the necessary bandwidth is reserved for VoIP traffic in the event of network congestion. The combination of these two elements provides the necessary Quality of Service (QoS) for VoIP traffic traversing over the WAN connection.

©2006 Avaya Inc. All Rights Reserved.

2. Configuration

Figure 1 illustrates the configuration used in these Application Notes. Telephones with extension range 3xxxx are registered with the Avaya S8300 Media Server on the right side of the figure, and telephones with extension range 2xxxx are registered with the Avaya S8500 Media Server on the left side of the figure. A uniform dial plan and an H.323 IP trunk were used to route calls between the two Avaya Media Servers. Note that extensions from both Avaya Communication Manager systems are located in each location. This is done to verify that the Avaya IP Telephones can register and place call successfully through a cRTP-enabled WAN connection.

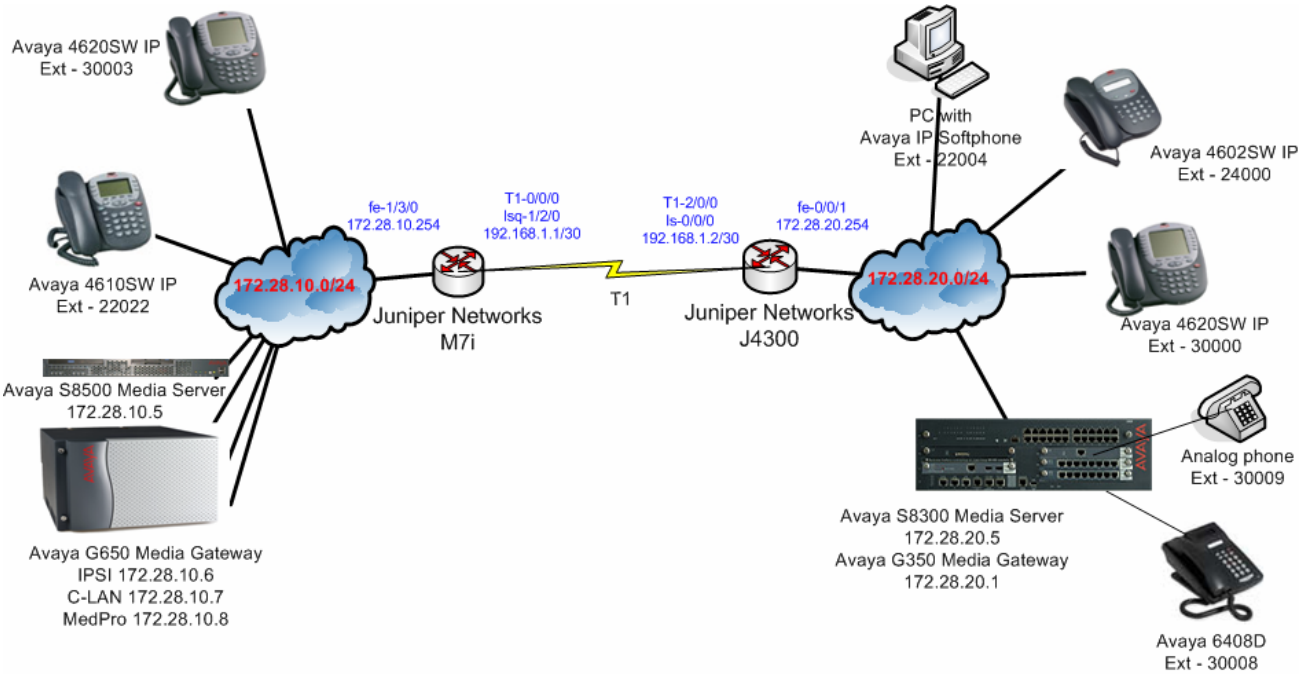

Figure 1: Sample Network Configuration

©2006 Avaya Inc. All Rights Reserved.

3. Equipment and Software Validated

The following equipment and software/firmware were used for the sample configuration:

Equipment	Software/Firmware
Avaya S8300 Media Server with G350 Media Gateway	Avaya Communication Manager R3.1 (R013x.01.0.626.0)
Avaya S8500 Media Server	Avaya Communication Manager R3.1 (R013x.01.0.626.0)
Avaya G650 Media Gateway	-
TN2312BP IPSI	FW 22
TN799DP C-LAN	FW 16
TN2302AP IP MedPro	FW 108
Analog telephone	N/A
Avaya 6408D digital Telephone	N/A
Avaya 4602SW IP Telephone (H.323)	R2.3 – Application (a02d01b2_3.bin)
Avaya 4610SW IP Telephone (H.323)	R2.3 – Application (a10d01b2_3.bin)
Avaya 4620SW IP Telephone (H.323)	R2.3 – Application (a20d01b2_3.bin)
Avaya IP Softphone	R5.24.8
Juniper Networks J4300 router	JUNOS 7.6R2.6
Juniper Networks M7i router	JUNOS 7.6R2.6

©2006 Avaya Inc. All Rights Reserved.

4. Avaya Communication Manager

There is no unique configuration required in Avaya Communication Manager to support cRTP or any feature mentioned in this document. For detailed information on the installation, maintenance, and configuration of Avaya Communication Manager, please consult references [1], [2], and [3].

Step	Description
1.	Below is the output from the **display ip-network-region** command showing the **MEDIA PARAMETERS**, and **DIFFSERV/TOS PARAMETERS** information configured in Avaya Communication Manager. All traffic used in the sample network is configured for network region 1. The **Call Control PHB Value** of **34** is equivalent to 100010 in binary. The **Audio PHB Value** of **46** is equivalent to 101110 in binary. The **MEDIA PARAMETERS**, and **DIFFSERV/TOS PARAMETERS** information will be needed in later sections when configuring the routers.

```
display ip-network-region 1                                   Page   1 of  19
                              IP NETWORK REGION
  Region: 1
Location:         Authoritative Domain:
    Name:
MEDIA PARAMETERS                Intra-region IP-IP Direct Audio: yes
      Codec Set: 1              Inter-region IP-IP Direct Audio: yes
   UDP Port Min: 2048                        IP Audio Hairpinning? n
   UDP Port Max: 3029
DIFFSERV/TOS PARAMETERS                  RTCP Reporting Enabled? y
 Call Control PHB Value: 34      RTCP MONITOR SERVER PARAMETERS
        Audio PHB Value: 46       Use Default Server Parameters? y
        Video PHB Value: 26
802.1P/Q PARAMETERS
 Call Control 802.1p Priority: 6
        Audio 802.1p Priority: 6
        Video 802.1p Priority: 5      AUDIO RESOURCE RESERVATION PARAMETERS
H.323 IP ENDPOINTS                                       RSVP Enabled? n
  H.323 Link Bounce Recovery? y
 Idle Traffic Interval (sec): 20
   Keep-Alive Interval (sec): 5
            Keep-Alive Count: 5
```


©2006 Avaya Inc. All Rights Reserved.

5. Configure the Juniper Networks Routers

The following sections describe steps for configuration for the Juniper Networks routers in the sample configuration. Unless other wise specified, all routers configuration are based on Juniper Networks recommendation. See references [5], [6], [7], and [8].

5.1. Configure the Juniper Networks J4300 router

This section shows the necessary steps in configuring the J4300 router as shown in the sample network in **Figure 1**. The following steps use the Command Line Interface (CLI) offered by the J4300 router.

Step	Description

1.	Connect to the J4300. Log in using the appropriate Login ID and Password.
	
	`login:`
	`Password:`
	
	A prompt similar to the following will appear after successful log in.
	
	`interop@J4300>`

2.	Enter configuration mode by typing in **edit** at the prompt.
	
	`interop@J4300> edit`
	`interop@J4300#`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

3.	Configure the **code-point-aliases** and **classifier** for Avaya VoIP traffic.
	
	• The alias helps identify the binary DSCP setting by giving it a name.
	• The sample network uses the name "avaya-rtp" to denote DSCP binary bit 101110 for media traffic. This is equivalent to the decimal **Audio PHB Value** of 46 set in Avaya Communication Manager for RTP Media in Section 4, Step 1.
	• The sample network uses the name "avaya-sig" to denote DSCP binary bit 100010 for signaling traffic. This is equivalent to the decimal **Call Control PHB Value** of 34 set in Avaya Communication Manager for signaling in Section 4, Step 1.
	
	`interop@J4300# edit class-of-service code-point-aliases`
	`interop@J4300# set dscp avaya-rtp 101110`
	`interop@J4300# set dscp avaya-sig 100010`
	`interop@J4300# exit`
	
	• Define a **classifier** called "Avaya-voip".
	• The **classifier** "Avaya-voip" defines the forwarding characteristic used by the router based on traffic type.
	• The sample configuration is configured to use expedited-forwarding with low loss-priority for "avaya-rtp", and assured-forwarding with low loss-priority for "avaya-sig".
	
	`interop@J4300# edit class-of-service classifiers`
	`interop@J4300# edit dscp Avaya-voip`
	`interop@J4300# set forwarding-class expedited-forwarding loss-priority low code-points avaya-rtp`
	`interop@J4300# set forwarding-class assured-forwarding loss-priority low code-points avaya-sig`
	`interop@J4300# exit`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

4.	Configure the scheduler to specify how much bandwidth to allocate for each type of traffic queue.
	
	• The sample configuration defines a **scheduler-maps** called "voip" and assigns a name for each of the 4 queue types.
	
	`interop@J4300# edit class-of-service scheduler-maps`
	`interop@J4300# edit voip`
	`interop@J4300# set forwarding-class best-effort scheduler be-sched`
	`interop@J4300# set forwarding-class expedited-forwarding scheduler ef-sched`
	`interop@J4300# set forwarding-class assured-forwarding scheduler af-sched`
	`interop@J4300# set forwarding-class network-control scheduler nc-sched`
	`interop@J4300# exit`
	`interop@J4300# exit`
	
	• Use the scheduler to define the percentage of bandwidth allocation to each traffic queue type.
	
	`interop@J4300# edit class-of-service schedulers`
	`interop@J4300# edit be-sched`
	`interop@J4300# set transmit-rate percent 10`
	`interop@J4300# set buffer-size percent 10`
	`interop@J4300# set priority low`
	`interop@J4300# exit`
	`interop@J4300# edit ef-sched`
	`interop@J4300# set transmit-rate percent 80`
	`interop@J4300# set buffer-size percent 80`
	`interop@J4300# set priority high`
	`interop@J4300# exit`
	`interop@J4300# edit af-sched`
	`interop@J4300# set transmit-rate percent 5`
	`interop@J4300# set buffer-size percent 5`
	`interop@J4300# set priority high`
	`interop@J4300# exit`
	`interop@J4300# edit nc-sched`
	`interop@J4300# set transmit-rate percent 5`
	`interop@J4300# set buffer-size percent 5`
	`interop@J4300# set priority high`
	`interop@J4300# exit`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

5.	Assign the **scheduler-map** to each interface.
	
	• Configure each interface with **scheduler-map** "voip" using the **classifier** defined above.
	
	`interop@J4300# edit class-of-service interfaces fe-0/0/1`
	`interop@J4300# set unit 0 scheduler-map voip`
	`interop@J4300# set unit 0 classifiers dscp avaya-voip`
	`interop@J4300# exit`
	`interop@J4300# edit class-of-service interfaces ls-0/0/0`
	`interop@J4300# set unit 0 scheduler-map voip`
	`interop@J4300# set unit 0 classifiers dscp avaya-voip`
	`interop@J4300# exit`
	`interop@J4300# edit class-of-service interfaces t1-2/0/0`
	`interop@J4300# set unit 0 scheduler-map voip`
	`interop@J4300# set unit 0 classifiers dscp avaya-voip`
	`interop@J4300# exit`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

6.	Configure the Ethernet and T1 interfaces.
	
	• Configure the Ethernet interface to use the scheduler.
	• Assign an IP address to the interface.
	
	`interop@J4300# edit int fe-0/0/1`
	`interop@J4300# set per-unit-scheduler`
	`interop@J4300# set unit 0 family inet address 172.28.20.254/24`
	`interop@J4300# exit`
	
	• Configure the logical interface for the WAN connection to use the scheduler.
	• Assign an IP address to the interface.
	• Specify the RTP traffic to be compressed. The sample configuration defines RTP traffic with port range 2048 to 3029 to be compressed. This port range needs to match to **UDP Port Min** and **UDP Port Max** configured in Avaya Communication Manager in Section 4, Step 1.
	
	`interop@J4300# edit int ls-0/0/0`
	`interop@J4300# set per-unit-scheduler`
	`interop@J4300# set unit 0 compression rtp port min 2048 max 3029`
	`interop@J4300# set unit 0 family inet 192.168.1.2/30`
	`interop@J4300# exit`
	
	• Configure the T1 interface to use the scheduler.
	• Configure the T1 interface timing, encapsulation, and timeslots.
	• Configure the T1 interface to use logical interface ls-0/0/0.0 defined above. An IP address is not necessary because an IP address is already defined for the logical interface.
	
	`interop@J4300# edit int t1-2/0/0`
	`interop@J4300# set per-unit-scheduler`
	`interop@J4300# set clocking external`
	`interop@J4300# set encapsulation ppp`
	`interop@J4300# set t1-options timeslots 1-24`
	`interop@J4300# set unit 0 compression-device ls-0/0/0.0`
	`interop@J4300# exit`

7.	Configure the routing options for the J4300 router. The sample configuration uses static routes.
	
	`interop@J4300# edit routing-options static`
	`interop@J4300# route 172.28.10.0/24 next-hop 192.168.1.1`
	`interop@J4300# exit`

8.	Save the changes. `interop@J4300# commit`

©2006 Avaya Inc. All Rights Reserved.

5.2. Configure the Juniper Networks M7i router

This section shows the necessary steps in configuring the M7i router as shown in the sample network in **Figure 1**. The following steps use the CLI.

Step	Description

1.	Connect to the M7i. Log in using the appropriate Login ID and Password.
	
	`login:`
	`Password:`
	
	A prompt similar to the following will appear after successful log in.
	
	`interop@M7I>`

2.	Enter configuration mode by typing in **edit** at the prompt.
	
	`interop@M7I> edit`
	`interop@M7I#`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

3.	Configure the **code-point-aliases** and **classifier** for Avaya VoIP traffic.
	
	• The alias helps identify the binary DSCP setting by giving it a name.
	• The sample network uses the name "avaya-rtp" to denote DSCP binary bit 101110 for media traffic. This is equivalent to the decimal **Audio PHB Value** of 46 set in Avaya Communication Manager for RTP Media in Section 4, Step 1.
	• The sample network uses the name "avaya-sig" to denote DSCP binary bit 100010 for signaling traffic. This is equivalent to the decimal **Call Control PHB Value** of 34 set in Avaya Communication Manager for signaling in Section 4, Step 1.
	
	`interop@M7I# edit class-of-service code-point-aliases`
	`interop@M7I# set dscp avaya-rtp 101110`
	`interop@M7I# set dscp avaya-sig 100010`
	`interop@M7I# exit`
	
	• Define a **classifier** called "Avaya-voip".
	• The classifier "Avaya-voip" defines the forwarding characteristic used by the router based on traffic type.
	• The sample configuration is configured to use expedited-forwarding with low loss-priority for "avaya-rtp", and assured-forwarding with low loss-priority for "avaya-sig".
	
	`interop@M7I# edit class-of-service classifiers`
	`interop@M7I# edit dscp Avaya-voip`
	`interop@M7I# set forwarding-class expedited-forwarding loss-priority low code-points avaya-rtp`
	`interop@M7I# set forwarding-class assured-forwarding loss-priority low code-points avaya-sig`
	`interop@M7I# exit`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

4.	Configure the scheduler to specify how much bandwidth to allocate for each type of traffic queue.
	
	• The sample configuration defines a **scheduler-maps** called "voip", and assigns a name for each of the 4 queue types.
	
	`interop@M7I# edit class-of-service scheduler-maps`
	`interop@M7I# edit voip`
	`interop@M7I# set forwarding-class best-effort scheduler be-sched`
	`interop@M7I# set forwarding-class expedited-forwarding scheduler ef-sched`
	`interop@M7I# set forwarding-class assured-forwarding scheduler af-sched`
	`interop@M7I# set forwarding-class network-control scheduler nc-sched`
	`interop@M7I# exit`
	`interop@M7I# exit`
	
	• Use the scheduler to define the percentage of bandwidth allocation to each traffic queue type.
	
	`interop@M7I# edit class-of-service schedulers`
	`interop@M7I# edit be-sched`
	`interop@M7I# set transmit-rate percent 10`
	`interop@M7I# set buffer-size percent 10`
	`interop@M7I# set priority low`
	`interop@M7I# exit`
	`interop@M7I# edit ef-sched`
	`interop@M7I# set transmit-rate percent 80`
	`interop@M7I# set buffer-size percent 80`
	`interop@M7I# set priority high`
	`interop@M7I# exit`
	`interop@M7I# edit af-sched`
	`interop@M7I# set transmit-rate percent 5`
	`interop@M7I# set buffer-size percent 5`
	`interop@M7I# set priority high`
	`interop@M7I# exit`
	`interop@M7I# edit nc-sched`
	`interop@M7I# set transmit-rate percent 5`
	`interop@M7I# set buffer-size percent 5`
	`interop@M7I# set priority high`
	`interop@M7I# exit`

5.	Configure the queue assignment for each traffic type.
	
	`interop@M7I# edit class-of-service forwarding-classes`
	`interop@M7I# set queue 0 best-effort`
	`interop@M7I# set queue 1 expedited-forwarding`
	`interop@M7I# set queue 2 assured-forwarding`
	`interop@M7I# set queue 3 network-control`
	`interop@M7I# exit`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

6.	Assign the scheduler-map to each interface.
	
	• Configure each interface with **scheduler-map "**voip" using the **classifier** defined above.
	
	`interop@M7I# edit class-of-service interfaces fe-1/3/0`
	`interop@M7I# set unit 0 scheduler-map voip`
	`interop@M7I# set unit 0 classifiers dscp avaya-voip`
	`interop@M7I# exit`
	`interop@M7I# edit class-of-service interfaces lsq-1/2/0`
	`interop@M7I# set unit 0 scheduler-map voip`
	`interop@M7I# set unit 0 classifiers dscp avaya-voip`
	`interop@M7I# exit`
	`interop@M7I# edit class-of-service interfaces t1-0/0/0`
	`interop@M7I# set unit 0 scheduler-map voip`
	`interop@M7I# set unit 0 classifiers dscp avaya-voip`
	`interop@M7I# exit`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

7.	Configure the Ethernet and T1 interfaces.
	
	• Configure the Ethernet interface to use the scheduler.
	• Assign an IP address to the interface.
	
	`interop@M7I# edit int fe-1/3/0`
	`interop@M7I# set per-unit-scheduler`
	`interop@M7I# set unit 0 family inet address 172.28.10.254/24`
	`interop@M7I# exit`
	
	• Configure the logical interface for the WAN connection to use the scheduler.
	• Assign an IP address to the interface.
	• Specify the RTP traffic to be compressed. The sample configuration defines RTP traffic with port range 2048 to 3029 to be compressed. This port range needs to match to **UDP Port Min** and **UDP Port Max** configured in Avaya Communication Manager in Section 4, Step 1.
	
	`interop@M7I# edit int lsq-1/2/0`
	`interop@M7I# set per-unit-scheduler`
	`interop@M7I# set unit 0 compression rtp port min 2048 max 3029`
	`interop@M7I# set unit 0 family inet 192.168.1.1/30`
	`interop@M7I# exit`
	
	• Configure the T1 interface to use the scheduler.
	• Configure the T1 interface timing, encapsulation, and timeslots.
	• Configure the T1 interface to use logical interface lsq-1/2/0.0 defined above. An IP address is not necessary because an IP address is already defined for the logical interface.
	
	`interop@M7I# edit int t1-0/0/0`
	`interop@M7I# set per-unit-scheduler`
	`interop@M7I# set clocking internal`
	`interop@M7I# set encapsulation ppp`
	`interop@M7I# set t1-options timeslots 1-24`
	`interop@M7I# set unit 0 compression-device lsq-1/2/0.0`
	`interop@M7I# exit`

9.	Configure the routing options for the M7i router. The sample configuration uses static routes.
	
	`interop@M7i# edit routing-options static`
	`interop@M7i# route 172.28.20.0/24 next-hop 192.168.1.2`
	`interop@M7i# exit`

10.	Save the changes. `interop@M7i# commit`

©2006 Avaya Inc. All Rights Reserved.

6. Verification Steps

The following steps may be used to verify the configuration.

Step	Description
1.	Verify network connectivity using "ping" from the PC. All network devices including Avaya IP Telephones should be reachable.

2.	Use the **show services crtp flows** command on the Juniper routers to verify traffic is being compressed. For an active phone call, there should be at least two flows displayed, one transmit and one receive.
	
	`interop@J4300> show services crtp flows`
	`Interface: Interface: ls-0/0/0.0`
	`  Flow  Source  Destination  SSRC ID  Ctx ID`
	`  Transmit  172.28.20.128:2300  172.28.10.128:2594  1847753485  7`
	`  Receive  172.28.10.128:2594  172.28.20.128:2300  327775943  80`

3.	Use the **show interfaces queue** command on the Juniper routers to verify traffic is being forward via the correct queue. The following output shows the information for an active phone call (50 pps) being sent out on queue 1 (expedited-forwarding queue). A portion of the output concerning Queue 0, Queue 2, and Queue 3 has being abbreviated.
	
	`interop@J4311> show interfaces queue t1-2/0/0`
	`Physical interface: t1-2/0/0, Enabled, Physical link is Up`
	`  Interface index: 139, SNMP ifIndex: 34`
	`Forwarding classes: 8 supported, 8 in use`
	`Egress queues: 8 supported, 8 in use`
	`Queue: 0, Forwarding classes: best-effort`
	`  Queued:`
	`  Packets : 173342 150 pps`
	`  Bytes : 40575543 1784400 bps`
	`Queue: 1, Forwarding classes: expedited-forwarding`
	`  Queued:`
	`  **Packets : 46978 50 pps**`
	`  Bytes : 2361646 25944 bps`
	`  Transmitted:`
	`  Packets : 46978 50 pps`
	`  Bytes : 2361646 25944 bps`
	`  Tail-dropped packets : 0 0 pps`
	`  RED-dropped packets : 0 0 pps`
	`  Low : 0 0 pps`
	`  Medium-low : 0 0 pps`
	`  Medium-high : 0 0 pps`
	`  High : 0 0 pps`
	`  RED-dropped bytes : 0 0 bps`
	`  Low : 0 0 bps`
	`  Medium-low : 0 0 bps`
	`  Medium-high : 0 0 bps`
	`  High : 0 0 bps`
	`Queue: 2, Forwarding classes: assured-forwarding`
	`  Queued:`
	`  Packets : 217241 0 pps`

©2006 Avaya Inc. All Rights Reserved.

Step	Description

```
    Bytes                :          12011825                    0 bps
  Queue: 3, Forwarding classes: network-control
    Queued:
      Packets            :              9722                    0 pps
      Bytes              :            141217                    0 bps
```

4. Use the **show class-of-service forwarding-table** command on the Juniper routers to verify the bandwidth allocation has been assigned to each interface. The following output has been abbreviated to only show the relevant interfaces. The allocation of bandwidth should match what is configured in Step 4 of Section 5.1 and 5.2.

```
interop@J4300> show class-of-service forwarding-table
Classifier table index: 12, # entries: 8, Table type: IPv4 precedence
Entry #   Code point   Queue #   PLP
   0          000        0       0
   1          001        0       1
   2          010        0       0
   3          011        0       1
   4          100        0       0
   5          101        0       1
   6          110        3       0
   7          111        3       1

Classifier table index: 6440, # entries: 2, Table type: DSCP
Entry #   Code point   Queue #   PLP
   0        100010       2       0
   1        101110       1       0
                       Table Index/
Interface      Index      Q num      Table type
sp-0/0/0.16383    66         12      IPv4 precedence
ls-0/0/0.0        67       6440      DSCP
fe-0/0/0.0        68         12      IPv4 precedence
fe-0/0/1.0        69       6440      DSCP

Interface: ls-0/0/0, (Index: 134,, Map index: 2,, Map type: FINAL,, Num
of queue
s: 2):
Index: 0
  Entry 0 (Scheduler index: 17, Queue #: 0):
    Tx rate: 0 Kb (95%), Buffer size: 95 percent
Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
  Entry 1 (Scheduler index: 19, Queue #: 3):
    Tx rate: 0 Kb (5%), Buffer size: 5 percent
Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

Interface: fe-0/0/1, (Index: 138,, Map index: 2,, Map type: FINAL,, Num
of queue
s: 2):
Index: 0
  Entry 0 (Scheduler index: 17, Queue #: 0):
    Tx rate: 0 Kb (95%), Buffer size: 95 percent
Priority low
    PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
  Entry 1 (Scheduler index: 19, Queue #: 3):
    Tx rate: 0 Kb (5%), Buffer size: 5 percent
Priority low
```


©2006 Avaya Inc. All Rights Reserved.

Step	Description

```
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

    Interface: t1-2/0/0, (Index: 139,, Map index: 2,, Map type: FINAL,, Num
    of queue
    s: 2):
    Index: 0
      Entry 0 (Scheduler index: 17, Queue #: 0):
        Tx rate: 0 Kb (95%), Buffer size: 95 percent
    Priority low
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
      Entry 1 (Scheduler index: 19, Queue #: 3):
        Tx rate: 0 Kb (5%), Buffer size: 5 percent
    Priority low
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

    Interface: ls-0/0/0.0, (Index: 67,, Map index: 45418,, Map type: FINAL,,
    Num of
    queues: 4):
    Index: 0
      Entry 0 (Scheduler index: 13005, Queue #: 0):
        Tx rate: 0 Kb (10%), Buffer size: 10 percent
    Priority low
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
      Entry 1 (Scheduler index: 62197, Queue #: 1):
        Tx rate: 0 Kb (80%), Buffer size: 80 percent
    Priority high
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
      Entry 2 (Scheduler index: 62165, Queue #: 2):
        Tx rate: 0 Kb (5%), Buffer size: 5 percent
    Priority high
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
      Entry 3 (Scheduler index: 45740, Queue #: 3):
        Tx rate: 0 Kb (5%), Buffer size: 5 percent
    Priority high
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

    Interface: fe-0/0/1.0, (Index: 69,, Map index: 45418,, Map type: FINAL,,
    Num of
    queues: 4):
    Index: 0
      Entry 0 (Scheduler index: 13005, Queue #: 0):
        Tx rate: 0 Kb (10%), Buffer size: 10 percent
    Priority low
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
      Entry 1 (Scheduler index: 62197, Queue #: 1):
        Tx rate: 0 Kb (80%), Buffer size: 80 percent
    Priority high
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
      Entry 2 (Scheduler index: 62165, Queue #: 2):
        Tx rate: 0 Kb (5%), Buffer size: 5 percent
    Priority high
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1
      Entry 3 (Scheduler index: 45740, Queue #: 3):
        Tx rate: 0 Kb (5%), Buffer size: 5 percent
    Priority high
        PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1

    Interface: t1-2/0/0.0, (Index: 70,, Map index: 45418,, Map type: FINAL,,
    Num of
    queues: 4):
    Index: 0
      Entry 0 (Scheduler index: 13005, Queue #: 0):
        Tx rate: 0 Kb (10%), Buffer size: 10 percent
```


©2006 Avaya Inc. All Rights Reserved.

Step	Description
	Priority low PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1 Entry 1 (Scheduler index: 62197, **Queue #: 1**): Tx rate: 0 Kb (80%), **Buffer size: 80 percent** Priority high PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1 Entry 2 (Scheduler index: 62165, **Queue #: 2**): Tx rate: 0 Kb (5%), **Buffer size: 5 percent** Priority high PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1 Entry 3 (Scheduler index: 45740, **Queue #: 3**): Tx rate: 0 Kb (5%), **Buffer size: 5 percent** Priority high PLP high: 1, PLP low: 1, PLP medium-high: 1, PLP medium-low: 1 RED drop profile index: 1, # entries: 1 Drop Entry Fullness(%) Probability(%) 0 100 100

7. Conclusion

These Application Notes have described the administration steps required to configure cRTP to function between Juniper Networks M7i and J4300 routers over a Point-to-Point Protocol connection. Quality of Service was implemented through the use of DSCP information for traffic priority queue assignment and the use of bandwidth allocation on all the interfaces. There was no detectable difference in voice quality between VoIP traffic that has been through header compression to traffic that has not been through header compression. Basic features such as Transfer, Conference, and DTMF detection continue to function over a cRTP environment.

©2006 Avaya Inc. All Rights Reserved.

8. Additional References

Product documentation for Avaya products may be found at http://support.avaya.com

[1] *Administrator Guide for Avaya Communication Manager*, Doc # 03-300509, Issue 1, June 2005
[2] *Avaya Communication Manager Advanced Administration Quick Reference*, Doc # 03-300364, Issue 2, June 2005 Release 3.0
[3] *Administration for Network Connectivity for Avaya Communication Manager*, Doc # 555-233-504, Issue 6, May 2003
[4] *Avaya IP Telephony Implementation Guide*, May 1, 2006

Product documentation for Juniper Networks products may be found at http://www.Juniper.net

[5] *CLI User Guide (JUNOS Internet Software for J-series, M-series, and T-series Routing Platform) Release7.6*, Part Number 530-015682-01, Revision 1
[6] *JUNOS Internet Software for J-series, M-series, and T-series Routing Platforms, Class of Service Configuration Guide Release 7.6*, Part Number 530-015688-01, Revision 1
[7] *JUNOS Internet Software for J-series, M-series, and T-series Routing Platforms, Network Interfaces Configuration Guide Release 7.6*, Part Number 530-015687-01, Revision 1
[8] *JUNOS Internet Software for J-series, M-series, and T-series Routing Platforms, Services Interfaces Configuration Guide Release 7.6*, Part Number 530-015687-01, Revision 1

©2006 Avaya Inc. All Rights Reserved.

©2006 Avaya Inc. All Rights Reserved.
Avaya and the Avaya Logo are trademarks of Avaya Inc. All trademarks identified by ® and ™ are registered trademarks or trademarks, respectively, of Avaya Inc. All other trademarks are the property of their respective owners. The information provided in these Application Notes is subject to change without notice. The configurations, technical data, and recommendations provided in these Application Notes are believed to be accurate and dependable, but are presented without express or implied warranty. Users are responsible for their application of any products specified in these Application Notes.

Please e-mail any questions or comments pertaining to these Application Notes along with the full title name and filename, located in the lower right corner, directly to the Avaya Solution & Interoperability Test Lab at interoplabnotes@list.avaya.com